KENYA

IMPROVING SMALLHOLDER DAIRY DEVELOPMENT, MARKET LINKAGES AND CONSUMER NUTRITION AWARENESS INITIATIVE

USAID Agreement 623-A-00-01-00131-00

FINAL REPORT

August 31, 2001 – June 1, 2002

Submitted to USAID/Nairobi

In support of USAID/Kenya's SO 2.0, "Increased Rural Household Incomes"

Submitted by
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FINAL REPORT

Dates of project:	August 31, 2001 – June 1, 2002
Total Estimated Federal Funding:	$609,116
Actual Match-Cost Contribution:	$228,795 or 37.6%
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1. EXECUTIVE SUMMARY

Implementation of this project was through the Land O'Lakes, Heifer Project International (HPI), and African Breeders Service/Total Cattle Management (ABS/TCM) consortium. These three organizations have been directly engaged in developing Kenya's private sector dairy industry over the years. During this time, there has been positive response from project beneficiaries as well as significant development impact. The sector harbors evident potential for continued improvement in productivity and economic growth. The shared belief in, and commitment towards, development of the dairy sub-sector brought the Land O'Lakes led consortium together as a team to undertake an intensive six-month program to build upon attained industry improvements and advancement of productivity throughout the dairy farm-to-market system.

The project objective was to reinforce the proven industry-led, private sector approach to dairy development. Past experience reveals tangible contributions of this approach towards enhancing food security and fostering economic growth. Specifically, this project was committed to the following goals:

1. Completing work started earlier to privatize distribution, collection, breeding, processing, marketing and extension in the dairy industry in Kenya.
2. Contributing to reducing Kenya's dependence on donor aid as a primary source of support for the dairy industry, thus ensuring sustainability.
3. Making milk production not only a source of income, but also a key component and catalyst for a community nutrition program to reduce under-nutrition and malnutrition, especially among children, nursing and expectant mothers.
4. Conduct a six-month nutritional and health campaign using the medium of radio to create increased consumer awareness around the goodness and wholeness of milk.

With Land O'Lakes playing the lead role in project management, the consortium accomplished and exceeded stated goals. Key to this was team building and effective co-ordination of well-defined activities carried out by each organization.

In summary, the project achieved a Net Present Value (NPV) of $US 990,602 over the project duration that corresponds to an Internal Rate of Return (IRR) of 304%. These financial values assume a highly conservative 30% discount rate for the calculation. The consortium was not able to secure an appropriate risk rate from USAID for use in discounting dairy development funds. Appendix I to this report details other assumptions used to make the calculations. Finally, 37.6% or $US 228,795 was raised from the private sector and dairy stakeholders as their cost-share contribution to this important initiative.

The goal, objectives and activities tabulated on the next page guided the consortium's initiatives and performance indicators. These were agreed and approved by USAID.

2. USAID-APPROVED WORKPLAN

GOAL	INDICATORS	ASSUMPTIONS
Increased rural household incomes	Increase household income by 10% for participating trainees	• Stable political climate • Immediate availability of funding from USAID • Normal short rains • No major livestock epidemic
OBJECTIVE		
1. Increase dairy productivity	A) Milk production per cow per day increased by 15% B) Reduced cost of production by 10% by participating producers	
2. Increased consumption of dairy products	A) 5% increase in sales of processed dairy products by participating processors	
ACTIVITIES		
1. Training	• 15, 000 people trained and 30% adopt improved practices	
2. Raising consumer awareness	• 500, 000 people reached through KISS FM radio. • 20% of the people reached change their attitude towards dairy products	
3. Transfer of improved technologies.	• 30 entrepreneurs are trained, and 45% (i.e., 13 trainees) establish businesses • The volume of breeding inputs increases by Kshs 2 million (U.S. Dollars 25,641)	
4. Promoting market linkages.	• 6 market linkages established • The volume of milk sales increased by Kshs. 27 million (US Dollars 346,154) • Volume of inputs purchased by producers increased by Kshs. 3.5 million (US Dollars 44,872)	

3. COMPLETED TASKS AND OBJECTIVES

The following condensed summary of information charts compare the workplan targets agreed with USAID to actual impact achieved from project activities.

GOAL	INDICATOR	PROJECT IMPACT
Increased rural household incomes	Increase household income by 10% for participating trainees	Average increase in income per-household from milk was increased by an estimated 78%, i.e., Kshs. 1,885 ($US 24) to Kshs. 3,355 ($US 43). Sample area comprised 8,601 farm households

OBJECTIVE	INDICATOR	PROJECT IMPACT
1. Increase dairy productivity	• Milk production per cow per day increased by 15% • Reduced cost of production by 10% by participating producers	1. Milk production per cow increased from 4.5 liters per day to 8 liters per day, i.e., 78% 2. Cost of production reduced by 6%
2. Increased consumption of dairy products	• 5% increase in sales of processed dairy products by participating processors	3. Sales of flavored milk for one of the leading processors increased 5.58% on average during the period of the funding

ACTIVITIES	INDICATORS	PROJECT IMPACT
1. Training	• 15,000 people trained and 25% adopt improved practices	1. 20,784 project participants were trained during the length of the project. Adoption rate of 27.5% for new technologies reported
2. Raising consumer awareness	• 500,000 people reached through KISS FM radio • 20% of the people reached change their attitude towards dairy products	2. 1,546,368 Nairobi residents within the target age group of 15- to 24-year-olds reached through KISS FM radio. 3. 33% of people surveyed acknowledged a favorable change of attitude towards dairy products
3. Transfer of improved technologies	• 30 entrepreneurs are trained, and 45% (i.e., 13 trainees) establish businesses • The volume of breeding inputs increases by Kshs 2 million ($US 25,641)	4. 137 project participants trained in AI and entrepreneurship skills. 88 (64%) established businesses 5. 8,884 inseminations using imported U.S. semen achieved. Procurement and consumption of quality U.S. equipment and supplies amounts to $US 49,500 (Kshs. 3,861,000) over the project period
4. Promoting market linkages	• Six (6) market linkages established • The volume of milk sales increased by Kshs. 27 million ($US 346, 154) • Volume of inputs purchased by producers increased by Kshs. 3.5 million ($US 44, 872)	6. Eight (8) Linkages established for input supplies 7. Linkage of farmers in Kipkelion and Ol Kalou to Spin Knit Dairy facilitated sale of 2,655,644 liters of milk, yielding milk income proceeds amounting to $US 476,654 (Kshs. 37,179,016) 8. Volume of inputs purchased by producers increased by Kshs. 4.8 million ($US 61,538)

The condensed summary on the previous page indicates the consortium's successes as:

- Raised consumer awareness on the nutritional benefits of milk through a first-time ever generic nutritional message that reaches over 1.5 million Nairobi residents and increases the sales of a leading processor by an estimated 5.58%. Moreover, 33% of people surveyed acknowledge a favorable change of attitude towards dairy products.

- Creation of a private extension support system by training of entrepreneurs and farmers. Whilst entrepreneurs are equipped with skills to deliver quality private extension services, farmers and producers are equipped with knowledge on maximizing productivity. A total of 200 jobs created in the project period.

- Creation of wealth through increased cow production estimated at 125% milk-related economic gain. Other related linkages include improved value of the cattle as replacement breeding stock, veterinary inputs, feed and milking equipment inputs.

- Creation of indigenous entrepreneurs who are driven by profit incentives to provide quality services. Direct personal income to entrepreneurs generated under the project is worth more than $US 43,590 (Kshs. 3.4 million).

- Continued access of the Kenya market by U.S. genetics and products that create backward economic linkages for the U.S. artificial breeding industry and improve forward linkages to the Kenyan dairy industry. The impact of the consortium achievements from U.S. imports is worth $US 342,220 (Kshs. 26,693,160).

- Creation of an enlightened farmer-organization membership capable of effectively participating in the management of their organizations.

- Creation of democratic management systems and transparent business practice amongst training beneficiary-organizations.

- Facilitation of effective and widespread adoption of improved technologies by project beneficiaries.

- Creation of a credit mechanism using the Dairy Enterprise Fund, thus facilitating sustained provision of private nutrition and breeding input (liquid nitrogen) services for the dairy industry through the feed analysis laboratory and liquid nitrogen plant.

4. UNCOMPLETED TASKS AND OBJECTIVES

The implementation set-up and management for two milk collection and cooling centers was not completed as originally planned under the project for the following reasons:

- **Ol Kalou Dairy** – Approval for allocation of land for the collection/cooling site by the Kenya Government took a considerable amount of project time and was only concluded in January 2002. Once land allocation was secured, the process of tendering for development of waste treatment facilities, water supply (bore-hole) and construction began. This process was in progress by the time the project expiry date arrived.

- **Kipkaren Dairy** – The identified collection/cooling site was located in a rural center devoid of suitable permanent buildings, piped water and electricity connection. Negotiations with Kenya Power & Lighting Company (KPLC) for connection of electricity and arrangements for water supply with the relevant local authority were key delaying factors that had to be concluded. In addition to the electricity and water supply, the process of developing the chosen site into a collection center also consumed a significant amount of time. In the case of the location, the farmers identified two suitable buildings, which were in the course of being renovated and water source was identified by the time the project expired.

- **Reduction in Cost of Production** - Reduction in cost of production achieved by the consortium was 6% against the target of 10%. The major cost components as per Tegemeo Institute (see Appendix II) data are labor, feed supplementation, vet services and acaricides. While labor and acaricide cost components may remain relatively static in the consortium project area, the expectation is that feed supplementation and veterinary service costs will decline on account of consortium-triggered enhanced feed conservation, fodder establishment and improved husbandry practices. These benefits will accrue after the project lifetime as farmers begin utilizing conserved feed instead of supplements, forage established is fed to animals thus reducing commercial fodder requirements, and improved husbandry and animal nutrition standards accordingly reduce veterinary costs.

5. DETAILED PROJECT PERFORMANCE SCHEDULE

A. TRAINING

Event	**Field Days**
No. Trained	20,615
Details	Farmers trained on: Fodder establishment and conservation, breeding, calf rearing, prevention/control of tick-borne diseases, feeds and feeding, improving fertility, and dairy records. Areas where training was focused were: Kericho, Bomet, and Buret Districts Uasin Gishu District Nakuru and Laikipia Districts Embu, Meru and Machakos Districts Nyandarua and Nyeri Districts Malindi, Kilifi, Kwale, Taita Taveta Districts **Sex Ratio (Male: (63%:37%)**
Major Impact	• 448.5 metric tons (448,500 Kgs) of forage material was ensiled by project participants using silage technologies taught at field days; participant farmers were subsequently able to supply 125,580 liters of milk during the dry season, earning Kshs. 1,883,700 ($US 24,150) in additional household income for project area of Nyandarua. • Dairy production training activities enabled average increase in productivity in sample areas, from 4.5 liters per day to 8 liters per day (78%) per cow. Average increase in income per-household from milk was Kshs. 1, 470 ($US 19), i.e., Kshs. 1,885 ($US 24) to Kshs. 3,355 ($US 43). Sample area comprised 8,601 farm households in Kericho, Bomet & Buret districts. Derived cumulative income increase = 8,601 x Kshs. 1,470 =Kshs. 12,643,470 ($US 162,096). Other impacts: • Calf mortality reduced by 35%. • Calving intervals reduced from 24 months to below 18 months. • Increased economic activity in consortium dairy areas due to increase in farmers' disposable income.

Event	**Management Training Courses**
No. Trained	120
Details	Courses conducted for 22 co-operative society management committees on: Leadership, gender issues, co-operative law, business development, cashflow planning, project appraisal, management of AI projects and milk marketing in a liberalized economy and other relevant topics.
Major Impact	• 5 co-operative societies (Lessos, Ngukurani, Gaturiri, Island, Naro Moru Co-operative Societies) were able to update their bylaws so as to comply with the Co-operative Societies Act, No. 12 of 1997. • 3 co-operative societies (Masii Farmers Co-operative Society LTD, Wamunyu Farmers Co-operative Society LTD & Lessos Farmers Co-operative Society LTD) were able to develop business proposals to present to potential financiers for capital development. • Societies have been able to devise effective monthly-based business monitoring methodologies. This is an improvement of previous systems where business performance monitoring was only done every 3 months (quarterly). • Regular auditing of society books is now an accepted practice with the groups and societies that work with the consortium. • Improved co-operation between regional societies and sharing of views across regions thus leading to harmonization of co-operative development and member welfare issues.

Event	**Small-Scale Processing & Milk Handling Courses**
No. Trained	87
Details	Course conducted for proprietors/potential proprietors of small milk-handling businesses and dairy co-operative societies on: Small-scale milk processing, hygienic milk handling, legal requirements for establishing milk trading businesses and basic entrepreneurship skills.
Major Impact	• Cumulative impact noted for milk traders and dairy co-operatives from small-scale processing and improved milk handling training in terms of increased business and reduction in spoilage was Kshs. 54,750,000 ($US 701,912).

Event	Artificial Inseminators and Entrepreneurship Training
No. Trained	137
Details	Technical AI training and Agribusiness Entrepreneurship skills
Major Impact	**Location/Region** — **Number of Inseminations** *Rift Valley:* Kericho, Bomet & Buret — 1,833 *North Rift Valley:* Uasin Gishu — 3,343 *Eastern Province:* Embu, Meru & Machakos — 2,445 *Central Province:* Nyandarua & Nyeri — 876 *Coastal Province:* Malindi, Kilifi, Kwale & Taita Taveta — 387 Total Cows Inseminated = 8,884 Estimated Impact from the confirmed inseminations: • Estimated conceptions = 6,219 (i.e., out of 8,884 inseminations = 70%) • Estimated surviving calves = 4,975 (i.e., out of 6,219 conceptions = 80%) • Estimated heifers born and raised = 2,488 (i.e., out of 4,975 calves = 50%) • Estimated value of yearling heifers @ 15,000 Kenya shillings per heifer, therefore, Estimated value of heifers born from US genetics is = Ksh. 37,320,000 ($US 478,461) • Estimated heifers successfully lactating = 2,239 • Estimated milk value per lactation = Kshs. 65,551,127 • ($US 840,399) Private AI Services Established by Trained Inseminators/Entrepreneurs: Region/Location — No. of AI Service Points Kericho, Bomet & Buret — 10 Uasin Gishu & Trans Nzoia — 10 Busia, Siaya, Bondo, Kakamega, Kisumu & Sabatia — 11 Kisii,Nyamira & Gucha — 3 Malindi, Kilifi, Kwale — 5 Taita Taveta — 5 Nyandarua — 10 Nakuru/ Naivasha — 6 Meru, Embu, Machakos — 16 Ongata Rongai, Karen, Uthiru, Kinoo, Kasarani, Ruai, Uplands, Kikuyu, Kiambu, Githunguri — 12 **Grand Total** — **88**

B. RAISING CONSUMER AWARENESS

Event	**KISS FM Radio Campaign.**
Details	Radio campaign conducted over 6 months to enhance awareness of the nutritional value of milk.
Major Impact	• At the end of the six-month advertising period, 1,546,368 Nairobi residents were reached (and verified hearing the campaign). • In Phase 1 of the campaign, 33% of Nairobians exposed to this campaign verified knowing that dairy contains vital nutrients. In phase 2, this number grew to 50%. • The campaign received very high liking scores and even 10/10 scores in some weeks. • The high potential consumers, i.e., upper- and middle-income earners found this campaign more memorable than lower-income earners. • The 15- to 24-year-old age bracket found this campaign most memorable. • Sales of flavored milk from a leading milk processor grew on average by 5.58%. This translates to an additional liters sold of approximately 251,100 assuming daily processing capacity of 150,000 (Kenya Dairy Board 1999 figures). The dollar value of this is $US 144,865 resulting in additional cash flow of $US 43,460 assuming that the processor sells the milk to outlets at Ksh 45 and makes a profit of 30% on sales price. The six-month profit benefit for a single processor is, therefore, calculated as $US 260,757. Data for other processors not available.

C. TRANSFER OF IMPROVED TECHNOLOGIES

Event	**Use of Improved Breeding Inputs**
Details	Using consortium-trained inseminators and entrepreneurs to transfer improved breeding technologies. An average inter-breed production of milk per cow per day in Kenya is estimated at 8 liters. Under a closed genetic market, where breeding takes place within the country's dairy animal population, genetic gain cannot exceed 1.5% per generation. Conversely, in an open market system where a country opens to Global Elite bulls/genetics that have higher potential genetic, gains can exceed 100%. As a result of introduction and infusion of U.S. genetics, average production of 18 liters of milk per cow per day has been achieved in areas where the consortium operates. This represents a genetic gain of 125 % for farmers using genetics imported from US. The economic impact of increased milk production per cow due to artificial insemination cannot be over emphasized since the increase in dairy productivity as a result of AI has a dramatic positive impact on the Kenyan economy.
Major Impact	• Value of breeding inputs imported for use by farmers increased by Kshs. 9,008,000 ($US 115,487).

D. PROMOTING MARKET LINKAGES

Event	**Establishment of Market Linkages Between Farmer Organizations/Individual Farmers and Processors/Private Agribusiness Entrepreneurs**
Details	Eight (8) milk and input supply market linkages established during the project. These were: 1. Cooper Kenya LTD. 2. Twiga Chemicals LTD. 3. Kenya Seed Company LTD. 4. Unga Farm Care (EA) LTD. 5. Kenya Farmers Association LTD, Kericho Branch. 6. Spin Knit Dairy LTD. 7. Premier Dairy LTD. 8. Hygrotech LTD.
Major Impact	• 2,655,644 liters of milk sold to major processors as a result of new market linkages. Total revenues paid to farmers during project life-time as a result of the new market linkages = Kshs. 37,179,016 ($US 476,654).

6. INVESTMENT RETURNS ON PROJECT FUNDING

The project returns across the consortium were measured using two financial ratios, namely: Net Present Value (NPV) and Internal Rate of Return (IRR).

	$US
NET PRESENT VALUE (NPV):	
1. NPV = - USAID INVESTMENT + YEAR 1 CASH/(1+r)	
INTERNAL RATE OF RETURN (IRR):	
2. IRR = PROJECT PAYOFF/USAID INVESTMENT	
CASH FLOW FROM CONSORTIUM INTERVENTIONS:	
A. TRAINING	
Field Days:	
Feed Conservation	24,150
Dairy Production	162,096
Sub-Total	***186,246***
B. SMALL-SCALE PROCESSING	701,912
Sub-Total	***701,912***
C. AI & ENTREPRENEURSHIP TRAINING	
Milk Value from Matured Heifers	840,399
Sub-Total	***840,399***
D. KISS FM RADIO CAMPAIGN	260,757
Sub-Total	***260,757***
E. MARKET LINKAGES	476,654
Milk Sales through New Market Linkages	***476,654***
GRAND TOTAL	**2,465,969**

NB: All amounts are in $US

Using the formulas outlined above, the Net Present Value using a 30% discount rate (i.e., specified as "r" in above table and the risk rate that is used in Kenya's commercial lending sector) is $US 990,602 with a corresponding IRR of 304%. These calculations show the consortium's performance across the range of their activities and states that dairy stakeholders targeted under the project increased their wealth by $US 990,602. Marketing cash flows are

approximated since companies sampled are mainly family controlled corporations that are presently unwilling to reveal actual trading data. Still, a leading processor advised that on an average percentage basis, impact on sales from consortium marketing activity amounted to 5.58%.

7. IMPACTS ON USAID INTERMEDIATE RESULTS

The results achieved by the consortium directly support USAID-Kenya's Strategic Objective 7.0 "Increased Rural Household Incomes" and Intermediate Results (IR), i.e.:

IR 7.1 Increased productivity of targeted agricultural sub-sectors,
IR 7.2 Increased agricultural trade,
IR 7.3 Increased access to business support services for micro- and small-enterprises, and
IR 7.4 Increased effectiveness of small-holder organizations to provide business services to members and represent their business interests.

IR 7.1 *Increased Productivity of Targeted Agricultural Sub-sectors*

Enhanced Growth Efficiency of Local Genetics:

The key in this area has been the use of improved genetic material. Due to hybrid vigor, efficiency of growth and heifer fertility has been significantly enhanced. Heifers from imported U.S. genetics are maturing at 9 months of age compared to 18 to 26 months for locally bred stock. U.S. genetics is now renowned in the Kenya dairy sector for high fertility, early maturity and significantly improved milk production and consistency abilities.

Increased Incomes to Dairy farmers:

For some of the consortium's specialized activities, e.g., genetic development, the ultimate impact manifests itself over a period of two-and-half to three years, through the stages of calving, attainment of puberty, pregnancy then lactation. It is worth noting that the artificial insemination industry in Kenya is responsible for the creation of more than 10,000 jobs in the economy, and the dairy industry as a whole generates incomes in excess of $350 million annually in terms of product sales and payroll.

Still, long term issues aside, the consortium witnessed significant reductions in labor cost and more efficient conversion of feed inputs to milk, reduced calf mortality and improved breeding efficiency within its areas of operation arising out of genetic development work.

Overall, incomes for farmers in consortium areas of operations increased significantly following improvements in productivity, reduction in unit production costs, improved progeny value and enhanced growth efficiency of the dairy animals and adoption of feed

conservation technologies. The economic indicators were manifested in improved milk production and sales, employment creation, extension service delivery through agribusiness entrepreneurs and sales of U.S. genetics, artificial insemination and breeding supplies.

IR 7.2 *Increased Agricultural Trade*

Opening Market to US Genetics and Supplies:
During the life of this project 18,500 units of genetics valued at $92,500 and dairy equipment and supplies valued at $49,760 worth of equipment and supplies were imported.

Improved Progeny Value:
The value of replacement stock has improved significantly as a result of genetic gains achieved. Breeders have been able to fetch better prices when selling replacement stock. In the consortium areas of operation, prices of replacement stocks have increased from US$320 to US$1,200 per bred heifer, representing an average increase of 275% per animal in breeder incomes.

IR 7.3 *Increased Access to Business Support Services for Micro and Small Enterprises*

Introduction of Sustainable Related Service Facilities:

An agribusiness school, feed analysis laboratory and liquid nitrogen production and distribution were successfully established. These enterprises operate commercially and the profits deposited in a Dairy Enterprise Trust that enables a credit mechanism for trained entrepreneurs. Success of these enterprises is demonstrated by the tremendous demand they generate; targets set are surpassed and training courses are always oversubscribed.

Customer demand for liquid nitrogen now surpasses consortium production capacity; this has necessitated a marketing alliance with a primary competitor, British Oxygen Company, whose production capacity is 10 times that of the consortium. Subsequently, during the life of the project, the consortium sold 7,268 units of liquid nitrogen valued at Kshs. 708,192. The entry of the consortium into the market created an element of competition that caused prices of liquid nitrogen to drop from Kshs. 95 per liter to Ksh.80, thus significantly improving profitability and efficiency of delivery to the producers.

Demand for feed analysis services is increasing at 10% per month as producers become more enlightened because of the consortium farmer education program. This increased utilization of analysis services will, in turn, lower costs of production as optimal least-cost rations are adopted and formulated by more farmers. Next, an estimated 102 laboratory analyses reports for feeds were produced during this project, generating Kshs. 153,000 in fee income.

Overall, the consortium strategy is to increasingly decentralize, as regional managers and trained entrepreneurs bring services closer to producers at community level.

IR 7.4 *Increased Effectiveness of Smallholder Organizations to Provide Business Services to Members and Represent their Business Interests.*

Management training courses rendered to project beneficiary organizations has enhanced awareness on business development, project appraisal techniques, cashflow planning, leadership, gender issues, as well as co-operative law amongst other issues. The courses also trigger increased adherence to statutory regulations previously lacking, largely on account of ignorance, such as updating of bylaws to comply with current law and regularity of democratic elections, incorporation of new services such as input stores and artificial insemination, as well as new market linkages that have provided assured and regular income streams. The management training work carried out by the consortium has also contributed significantly towards ensuring long-term stability and sustainability of the farmer organizations.

8. LESSONS LEARNED AND CHALLENGES FACED

A. LESSONS LEARNED

Marketing:

- A major learning from the KISS FM advertising campaign is the importance of focusing on a particular target group and the resulting selection of the right media vehicle that will reach them at the right time. When creating an advertising campaign, it is, therefore, vital to partner with communication and market research experts.
- Dropping or decreasing media expenditure results in a decrease of awareness. Not only did awareness levels drop dramatically when media expenditure declined but, recovery of previous levels of awareness proved to be more difficult. Clearly, the logical implication is that decreased awareness will likely lead to a decline in dairy sales, thus indicating the importance of a sustained, long-term media campaign.

Exploiting Local Business Acumen:

- A model found effective is to build a large core company (which can be locally or foreign owned or a combination of both), surrounded by a group of local businesses who then act as distributors, suppliers and service providers.

Willingness-to-Pay:

- Indicators, namely ability and willingness to meet the cost of agribusiness courses, insemination services and use of laboratory services at a fee, indicate how much value people attach to such improvements in their skill levels.

Collaboration:

- To achieve meaningful economic and financial project impacts, it is important to collaborate and to build strategic alliances. This is a point highlighted and strongly emphasized by all three organizations constituting the consortium.

Sustainability:

- Essential to harnessing the dairy industries full potential is drawing in the private sector by highlighting profitable opportunities that can be exploited and allocating appropriate development resources towards initial investment. Doing so ignites a chain reaction with increased awareness of dairy industry potential attracting more investment and participation from the private sector. This, in turn, increases demand for milk supply, thereby improving producer rural household income levels. Additional income streams allow farmers to reinvest in improved technologies and inputs. The multiplier effect causes increased demand for agribusiness support services and, at the end of the cycle, contributes towards enhancing national Gross Domestic Production (GDP) and reducing poverty levels.

Timing of Farmer Field Days/Seminars:

- Farmer training is most effectively accomplished during school holidays or during off farming seasons. Most farmers attend training sessions when children are available to assist with essential farm chores.

Training/Seminar Topics and Approach:

- Training topics covered should be farmer-driven. This was captured during the feasibility study. The farmer training needs to have demonstrations and avoid lecture style training.

Recognition of Government Role:

- Collaboration with government extension staff at all levels enabled substantial impact achievement through use of local expertise. This not only benefits the farmers but also ensures continuity of improved husbandry practices advocated by the consortium in project areas.

B. CHALLENGES FACED

Marketing:

- There is need for a long-term advertising campaign that converts a portion of soda and other beverage purchases into milk ones, thus benefiting all the stakeholders along the dairy value chain.

Gender and Cultural Practices:

- Addressing gender issues in project implementation has not been free from challenges owing to cultural differences. We observed cultural beliefs that vary between tribal groups. For example in the Coast, women constitute between 99 to 100% of participants, while in the North Rift Valley, occupied largely by the Kalenjins, cattle belong to men and hence the participants are predominantly males. In Central province, largely the Kikuyus, both men and women participate sometimes almost equally. Our activities continue to place more emphasis on women groups.

Government of Kenya's Role:

- There is need for continued dialogue with the Government of Kenya to reduce red tape, unscientific-based barriers to genetics, equipment and supplies imports, to remove or significantly reduce levies on AI inputs and to become more transparent in the issuance of permits. These issues were discussed in the USAID sponsored dairy stakeholders meetings of 2001 and more lobbying is needed to encourage government to support the private sector as the engine of economic growth. Experience shows the private sector is unable to compete with government subsidized services such as cattle breeding and delivery of breeding supplies. Therefore, for privatization to be successful, government must be actively pro-private sector growth. Indifference coupled with weak and ineffective policies prove a hindrance to economic growth. The challenge ahead is successful continuation of dialogue and partnership efforts to persuade government to progressively withdraw from the AI sector.

Limited Timeframe of Project:

- The renovation of buildings in Kipkelion and Kipkaren has taken an extended period to complete compared to the short project life. Where infrastructure development is concerned, practical as well as bureaucratic issues such as obtaining land allocation from local administrative authorities, consents for industrial/commercial premises use, electricity and water connections, building developments/renovations, often consume lengthy periods.

9. THE WAY FORWARD

Marketing:

- A recently published survey on the youth in Kenya showed that education, followed by health, are rated as the most important things in life and self-medication is widespread. In their spare time, the youth enjoy listening to music and watching movies. The most important insight to note is that whopping 82% drink sodas they have purchased themselves. *Ref: Holla Youth Study conducted by Consumer Insight.* Key to note, in combination with the Youth Survey results, is that an essential learning from the KISS FM program is that media expenditure increases advertising awareness and that the converse is true. There is thus clearly a justified need for a long-term advertising campaign that converts an element of soda and other beverage purchases into milk ones, thereby benefiting all the stakeholders along the dairy value chain.

Replication of Project Results:

- The University of Nairobi's Faculty of Veterinary Services has now replicated the consortium's agribusiness training by also initiating an Agribusiness School for Private AI training. Through a "Training of Trainers" approach, consortium initiatives such as feed conservation and improved animal husbandry practices are being conducted through facilitation of Ministry of Agriculture and Rural Development staff at divisional level. This enables wide exposure to improved technologies and creates increased demand for the technologies. The participative and demonstrative approach perfected by the consortium also contributes to this success.

Continuance of Ongoing Work:

- To complete the implementation of the projects which are on going, i.e., Ol Kalou, Kipkaren.
- To strengthen market linkages established during life of the project.
- To strengthen management of farmer organizations created during the project life.
- Continuance of regular monitoring and evaluation.
- To monitor adoption of technologies passed to the farmers during training period.

Private Sector Involvement:

- Increase exposure of interested potential private investors, whether micro-entrepreneurs or larger investors, to exploit investment opportunities in the dairy sector, so as to drive the industry forward, especially in terms of product development and marketing.

Developing Better Dialogue with the Government on Dairy Issues:

- The consortium has already cultivated excellent relations with relevant Government organs with respect to dairy issues. Further forums need to be created and facilitated using the

already respected USAID mediation, to enable continuance of dialogue on dairy development.

Discuss Project Results with USAID and Incorporate Suggestions:

- In the final project meeting, all three organizations expressed a desire that once USAID receives and digests the consortium final report, they be invited to discuss the project results. This is in response to the consortium desiring to receive constructive feedback which can then be incorporated into reporting under possible future projects. It was tentatively suggested that this meeting be held in September 2002 subject to confirmation with USAID.

APPENDIX I

Statistical Information
and
Economic Impact Assumptions

STATISTICAL INFORMATION AND ECONOMIC IMPACT ASSUMPTIONS

Exchange Rate US$1 = Kenya Shillings 78

Average Milk Price per Liter = Kshs.15

Training:

Fodder/Forage:
Average forage Yield per Acre Planted = 20,000KGS (20tons)
Average feed intake by a cow on silage = 25KGS per cow per day
Average Milk yield per cow due to silage alone for a cow fed 25 KGs of the silage = 7 liters per day
Forage material conserved by project participants during project life-time = 448, 500 KGS
Additional milk income to project participants on account of consortium forage conservation intervention = $\frac{448,500KG}{25KG}$ x 7 liters x Kshs. 15 = Kshs. 1, 883, 700 (US Dollars 24, 150)

Small-Scale Processing and Milk Handling:

87 participants trained (participants drawn from informal traders and dairy co-operative societies).
Increase in volume of milk sales after receiving consortium training = 2, 737, 500 liters over project lifetime.
Retail price of milk per liter = Kshs. 20
Training impact = US Dollars 701,912 (Kshs. 54,750,000)

Artificial Inseminators and Agribusiness Entrepreneurs Training:

Activity/ Description	Trained Entrepreneurs
Cows inseminated	8,884
Estimated conceptions	6,219
Estimated surviving calves	4,975
Estimated Heifers born and raised	2,488
Estimated heifers successfully lactating	2,239
Estimated milk value per lactation (Kshs.)	65,551,127
Estimated milk value per lactation (US$)	840,399
Estimated milk value of improved heifers per lactation (Kshs.)	147,490,036
Estimated milk value of improved heifers per lactation (US$)	1,890,898
Estimated % Economic gain	125

Backward linkage jobs created in the economy = 0.16
Forward linkage jobs created in the economy = 0.54
Thus for every AI job, there will be 0.70 jobs created
From the project results 121 inseminators are self employed as a result of the project activities. Thus, it can be inferred that jobs created in related forward and backward links including the AI industry considered would be (1+0.70) x 121 = 206 jobs.

Agribusiness Entrepreneurs Income Generated:

Backward linkage (indirect effect) for every AI $ = $0.28
Forward linkage (induced effect) for every AI $ = $0.94
Total effect (indirect plus induced effect) for $1 increase in AI personal income = $1.22
From the project results of entrepreneurs earning $35,961 it can be inferred that total personal income expenditures in the economy as a result of AI would be 1.22 x $35,961 = Kshs. 3,422,048 (US$43,872)
Of the people trained, 90% started their own business or went into partnership with established veterinary businesses and 5% are working on commercial dairy farms.

NB: Statistical analyses of the industry figures using regression models with a level of significance of 5% .($p<0.05$) level were used to estimate backward and forward linkages in project activities.

Transfer of Improved Technologies:

Cost of services
AI arms service = Kshs. 200 – 250 per insemination
Linear cow evaluation (GMS) = Kshs. 250 / cow
Castration = Kshs 300 / bull calf

Data on U.S. bull semen imported by consortium and its economic impact on milk production in Kenya:

Activity/ Description	**Value**
Semen units imported by consortium during project lifetime	18,500
Expected Conception at 1.42 units semen per pregnancy	13,028
Estimated heifers assuming a sex ratio of 50% male: 50% female	6,514
Female maturing to cows at 20% mortality rate	5,211
Projected milk production over 305 days in milk by parent average (liters)	28,608,309
Projected milk production over 305 days in milk by locally bred cows (liters)	12,714,840
Projected income from US genetics At Kshs. 15 per liter of milk	429,124,635
Projected income from locally bred cows at Kshs. 15 per liter of milk	190,722,600
Economic gain in Kshs. From use of US Imported genetics	238,402,035
Economic gain in US Dollars from use of US imported genetics	3,056,436
% Economic gain	125%
Numerical increase in milk production per cow per year (liters)	3,049

Calf mortality rate estimated at 20%
Conception rate observed is 70%
Expected sex ratio 50% male: 50% female
Expected # of heifers reaching mature equivalent (fertility, culling) = 90%
Average Interbreed production per cow per day = 8 liters
Interbreed Parent average production ((27+ 8)/2) = 18 liters

Agricultural Output and Trade Volume Impact:

Backward link for every $1 sales of US AI products = $0.61
Induced Forward link of economy = 1.81
Thus for every AI $1 generated in sales there will be an impact of $2.41 in the economy.
Given genetic and related equipment/supplies imports of US$142,000 it can be inferred that the industry impact is 2.41 x Kshs. 11,076,000 (US$142,000) = Kshs. 26,693,160 (or $US 342,220).

Project objective	Target	Actual	Variance
Increase in value of breeding inputs imported	Kshs. 2 million	Kshs. 11.08 million	Kshs. 9.08 million (454% increase)

Volume of US genetic exports and breeding inputs imported into Kenya during the project lifetime was Kshs. 11,076,000 (US$142,000).

Income Generation during Life of Project:

Description/Activity,	**Units**	**Value (Kshs)**
Liquid Nitrogen		
Liquid Nitrogen Production (liters)	12,000	-
Liquid nitrogen sales (40% evaporation loss)	7,268	708,192
Laboratory		
Laboratory Analyses of feeds	102	153,000
Agribusiness School Training		
Artificial Inseminators trained Tuition	72	1,656,000
Net income		474,000
(a) Breeding and Genetics:		
Semen Units Imported	18,500	7,215,000
(b) Equipment and Supplies		3,861,000
(c) Earnings by consortium-trained Entrepreneurs		2,804,958
Volume of business generated by consortium-trained AI technicians & agribusiness entrepreneurs: (a) +(b) + (c)		13,880,958

APPENDIX II

Tegemeo Institute – Cost of Production Data

TEGEMEO INSTITUTE, EGERTON UNIVERSITY **Appendix II**

MILK PRODUCTION BUDGETS 1999

Milk Production Cost Summary										
Production system						Large Scale Open Grazing			Small Scale	Zero-Grazing
District	Nyandarua	Nakuru	Nandi	Uasin Gishu	Kericho	Uasin Gishu	Nakuru	Kericho	Kiambu	Kiambu
									Low Cost	High Cost
# Cows	11	30	15	14	10	41	392	135	6	6
on milk	5	10	7	4	3	15	124	41	2	3
milking months	12	10	9	8	9	9	11	10	12	12
Milk per cow/Lactation	2,040.00	1,578.00	1,274.00	1,565.00	1,776.00	2,283.00	2,452.00	1,241.00	2,872.00	2,680.00
Total Milk Produced (lt)	9,222.00	15,320.00	7,570.00	5,408.00	3,915.00	32,431.00	347,450.00	53,556.00	9,347.00	5,400.00
Litres Sold	6,807.00	12,093.00	4,763.00	3,518.00	2,730.00	26,386.00	304,821.00	50,436.00	8,175.00	4,610.00
% of Milk Sold	**73%**	**74%**	**63%**	**66%**	**69%**	**80%**	**86%**	**87%**	**85%**	**85%**
Home consumption/day	7	11	8	5	3	18	133	19	4	2
Price per Liter marketed	15	14	11	13	13	13	16	12	18	18
Marketed Milk Revenue	100,241.00	168,114.00	52,309.00	45,737.00	33,863.00	343,012.00	4,620,315.00	605,226.00	141,914.00	82,395.00
Other Revenue	36,450.00	44,505.00	30,778.00	24,561.00	15,800.00	78,585.00	648,560.00	31,821.00	21,061.00	32,755.00
Total Revenue	136,691.00	212,619.00	83,087.00	70,298.00	49,663.00	421,597.00	5,268,875.00	637,047.00	162,975.00	115,150.00
Total Costs	33,785.00	56,070.00	29,204.00	28,764.00	24,554.00	279,181.00	3,686,445.00	608,289.00	122,589.00	100,339.00
Net Revenue	102,906.00	156,549.00	53,883.00	41,534.00	25,109.00	142,416.00	1,582,431.00	28,758.00	40,386.00	14,811.00
Net Income/Month	8,576.00	13,046.00	4,490.00	3,461.00	2,092.00	11,868.00	131,869.00	2,397.00	3,366.00	1,234.00
Cost per Liter Produced	**3.66**	**3.68**	**386**	**5.32**	**6.27**	**8.61**	**10.61**	**11.36**	**13.12**	**18.58**
Cost Per Liter Marketed	**4.96**	**4.64**	**6.13**	**8.18**	**8.99**	**10.58**	**12.09**	**12.06**	**15**	**21.77**
COST BREAKDOWN ON TOTAL PRODUCED										
Total Labour	1.63	2.8	1.89	2.68	3.58	3.78	2.07	6.28	4.98	8.33
Feed supplement		0.63	0.39	0.18	0.51	2.32	3.15	1.08	4.75	4.95
Other Feeds		1.17	0.04	0.24	0.03	0.19	0.59	0	2.17	2.73
Dewormers	0.25	0.65	0.18	0.57	0.22	0.49	0.8	0.43	0.13	0.21
Vet Services	0.14	0.24	0.31	0.3	0.8	0.6	2.71	0.18	0.19	1.18
Artificial Insemination	0.14					0	0.09	0.52	0.12	0.14
Chemicals/acaracides	0.33	1	0.84	1.06	0.9	1.06	0.58	1.36	0.04	0.05
Salt	1.19	0.53	0.21	0.27	0.24	0.15	0.33	1.51	0.55	0.68
Metered water/electricity							0.03		0.19	0.31
Transport							0.26			
	3.66	3.68	3.86	5.32	6.27	8.61	10.61	11.36	13.12	18.58

DERIVATION OF COST OF MILK PRODUCTION

Sample area: Kericho

	Small scale open grazing:	Large scale open grazing
Average cost breakdown	**Amount**	**Amount**
	(Kshs)	(Kshs)
Labor	3.58	6.28
Feed supplement	0.51	1.08
Other feeds	0.03	0.00
Dewormers	0.22	0.43
Vet services	0.80	0.18
Artificial insemination	0.00	0.52
Acaricides	0.90	1.36
Mineral supplementation	0.24	1.51
Metered water/electricity	0.00	0.00
Transport	0.00	0.00
Total Cost:	6.28	11.36

Derived Average Cost of Production for Small & Large Scale Open Grazing Systems:

6.28+11.36/2	=	**8.82**

Average Fixed Costs: Kshs			**Variable Costs: Kshs**
Labor	4.93	Feed supplement	0.80
Dewormers	0.33	Other feeds	0.02
Vet services	0.49	Salt	0.88
Artificial insemination	0.26		0.00
Acaricides	1.13		0.00
Sub-totals	7.14		1.69
As % of total cost:	80.90 %		19.10%

Production cost as %:		
At 4.5liters per day	=	13%
At 8 liters per day	=	7%
Variance	=	**6%**

NB: Source of Production Cost Data (Tegemeo Institute, Egerton University)